WHAT IS CLAIMED IS:

1. A tag apparatus, capable of detecting ,decoding and validating a radar message contained in an AM and FM signal component of a received LFM (linear frequency modulation) pulse waveform from a radar source, and encoding and retransmitting, back to the radar source, a tag message contained in a PM and FM signal component of a modified LFM pulse waveform, the apparatus comprising:

a) an antenna input circuit for receiving the LFM pulse waveform having digital information;

b) an AM/ FM signal component validation circuit, in electrical communication with said antenna, for detecting, decoding and validating said AM and FM components in the LFM waveform, and comparing the components to a predetermined criteria, in electrical communication with said antenna;

c) a delay element in electrical communication with the antenna for storing the received LFM pulse waveform;

d) a chopped repeater circuit, in electrical connection with the delay element for encoding the stored LFM pulse waveform in the delay element with a preprogrammed AM and a FM predetermined criteria to form a modified LFM pulse waveform;

e) timing synchronization circuitry for synchronizing the chopped repeater circuit of the modified LFM pulse waveform with reception of the received LFM pulse; and

f) an antenna output circuit, in electrical communication with the chopped repeater circuit, retransmitting of the modified LFM pulse back to the radar source.

2. The apparatus as recited in Claim 1, in which the AM signal component validation circuit further comprises a threshold comparator circuit to produce an AM After

Threshold Detect signal when the amplitude deviations of a demodulated AM component envelope of the LFM pulse waveform, exceed a DAC(Digital-to-Analog Converter) threshold voltage, said DAC threshold voltage being produced from a preprogrammed DAC threshold voltage stored digitally in a DSP in the tag.

3. The apparatus as recited in Claim 2, in which said AM signal validation circuit further comprises a time duration circuit, said time duration circuit validating the amplitude deviation time duration of the AM After Threshold Detect signal by comparing the AM After Threshold Detect time duration against a preprogrammed time duration criteria table contained within the DSP in the tag.

4. The apparatus as recited in Claim 3, wherein said FM signal component validation circuit further comprises a FM demodulation circuit, said demodulation circuit including a mixer and a local oscillator, said local oscillator frequency being in electrical communication with the mixer and operative to generate a local oscillator frequency signal by passing the LFM pulse waveform through a fixed constant time delay element.

5. The apparatus as recited in Claim 4, in which said FM signal validation circuit further comprises a frequency estimator circuit, said frequency estimator circuit being enabled when the AM After Threshold signal time duration has been validated by information in the preprogrammed time duration criteria table.

6. The apparatus as recited in Claim 5, in which said FM signal validation circuit further comprises a frequency estimator circuit, said frequency estimator circuit including a zero-crossing circuit, said zero-crossing circuit being operative to convert the FM signal component into a one bit value, said one bit value being sampled by a clock and applied to the DSP, the DSP calculating an average frequency during the AM After

Threshold time duration of the AM signal component of the LFM pulse waveform.

7. The apparatus as recited in Claim 6, wherein said FM validation circuit further comprises a preprogrammed digital codes table for decoding a message contained in the received LFM pulse waveform.

8. The apparatus as recited in Claim 7, wherein said AM/FM signal component validation circuit further comprises a slope polarity detector for determining the polarity of the slope, and comparing the slope to a slope criteria preprogrammed table for validation.

9. The apparatus as recited in Claim 8, wherein said slope polarity detector includes a 90° power splitter in electrical communication with the delay element and its outputs, one at 0° and the other at 90° relative to the first output, in electrical communication with at least one frequency estimator circuit, the frequency estimator circuit outputs are inputs into the DSP(Digital Signal Processor), the DSP using a software program in determining the polarity of the slope, and comparing the slope to a slope criteria preprogrammed table for validation.

10. The apparatus as recited in Claim 9, wherein the chopped repeater circuit further comprises a RF attenuator for the amplitude of the modified LFM waveform and a phase modulator for modifying the amplitude, phase modulation and frequency modulation of the stored LFM waveform and thereby generating the modified LFM waveform.

11. The apparatus as recited in Claim 10, wherein the phase modulator further comprises a phase shifter that is controllable up to a 5-bit resolution, that is in electrical communication with the delay element for receiving the stored LFM waveform and generating the modified LFM waveform.

12. The apparatus as recited in Claim 11, wherein the

phase shifter further comprises an attenuator that is controllable up to a 5-bit resolution.

13. The apparatus as recited in Claim 1, wherein said timing synchronization circuitry is connected to the DSP, and is operative to generate a chopping signal that is preprogrammed.

14. The apparatus as recited in Claim 13 wherein the timing synchronization circuit is controlled by the DSP for generating a random or pseudo-random modified LFM waveform transmission from a predetermined criteria table.

15. The apparatus as recited in Claim 14, wherein the chopping signal comprises a blanking signal portion, said blanking signal portion is generated when the tag apparatus is neither receiving nor transmitting.

16. The apparatus as recited in Claim 1, further comprising a plurality of RF switches, said plurality of RF switches being operative to receive the LFM pulse waveform and the modified LFM waveform and to selectively direct only one of the received LFM pulse waveform and the retransmitted modified LFM pulse waveform to the antenna.

17. The apparatus as recited in Claim 16, in which the chopped repeater circuit is operative to synchronize the transmission of the modified LFM waveform to a front edge of a received pulse of the LFM pulse waveform from the radar source.

18. The apparatus as recited in Claim 17, wherein the delay element is selected from a group comprising a coax cable, SAW, BAW, optical fiber, tuned filters and DRFM digital circuits.

19. The apparatus as recited in Claim 18, wherein RF switches are operative to select between the input and output circuits of the antenna, thereby permitting the use of a single antenna.

20. A method of decoding and encoding digital information contained within amplitude and frequency

modulated components of a received LFM pulse waveforms from a radar source, the method comprising the steps of:

a) receiving the LFM pulse waveform;

b) detecting the amplitude deviation of the LFM pulse waveform using an AM receiver;

c) detecting frequency deviations in the LFM pulse waveform using an FM receiver;

d) determining if the received demodulated amplitude and frequency deviation components of the LFM pulse waveform satisfies a predetermined criteria;

e) comparing preprogrammed time duration criteria data to the deviation components of the LFM pulse waveform;

f) decoding the digital information in the received LFM waveforms having components that satisfy the time duration criteria;

g) communication of the decoded information to a tag;

h) generating tag transmit data in response to the decoded information;

i) storing the received RF signal for possible retransmission;

j) encoding tag transmit data in the stored RF signal using PM and FM, the deviation components being stored data in a preprogrammed criteria table;

k) chopping the RF signal during transmission; and

l) transmitting the modified LFM pulse waveform in sync with the reception of an LFM pulse waveform with the encoded tag data.

21. The method of Claim 20, further comprising the step of detecting the phase slope of the frequency deviations in the LFM pulse waveform.

22. The method of Claim 21, further comprising the step of randomizing the length of the time duration of the chopped RF signal during tag transmission.

23. The method of Claim 21, further comprising the step of pseudo-randomizing the time duration of the chopped RF signal during tag transmission.

24. The method of Claim 22, further comprising the step of adding a blanking signal time within the time duration of the chopped RF signal.

25. The method of Claim 24, further comprising the step of synchronizing the transmission of the modified LFM pulse waveform with the leading edge of a front edge of a received pulse of the LFM pulse waveform from the radar source.

26. The method of Claim 25, further comprising the step of selectively enabling a single antenna to either receive the LFM pulse waveform and transmit the modified LFM pulse waveform.